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Habituation of Foodborne Pathogens Exposed to Extreme pH Conditions: Genetic Basis and Implications in Foods and Food Processing Environments

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Foodborne microorganisms capable of causing human diseases are exposed to a wide range of physical and chemical stresses in the environment. Exposure of cells to extreme, yet sublethal, preharvest and postharvest conditions can result in habituation or adaptation, which may subsequently afford protection against otherwise lethal stresses. The genetic basis for production of acid-shock proteins and heat-shock proteins as well as other intracellular and extracellular factors that play a role in the development of tolerance and cross protection to environmental stresses has been studied extensively, the focus largely being directed toward *Escherichia coli* and *Salmonella*. Less is known about habituation of other foodborne pathogens and spoilage microorganisms in extreme alkaline environments. Exposure of cells to sublethal concentrations of alkaline cleaners and sanitizers routinely used in food processing plants, for example, creates conditions for alkaline habituation which may result in cross protection against heat or other pasteurization or preservation technologies used in the food industry. This paper briefly reviews the genetic basis for development of tolerance of foodborne pathogens to extreme pH conditions and discusses some of the practical implications in foods and food processing environments.

Keywords: foodborne pathogen, acid stress, alkali stress, extreme pH habituation

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